APPENDICES TABLES 1-73

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F/V *EASTWARD HO* Assemblage Survey of Hecate Strait, May 24-June 13, 1989

B. L. Antonsen, R. P. Foucher, J. Fargo,
G. E. Gillespie, T. Johansson, A. V. Tyler
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Nanaimo, British Columbia V9R 5K6

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Fisheries and Oceans Pêches et Océans

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Canadian Data Report of Fisheries and Aquatic Sciences

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F/V EASTWARD HO ASSEMBLAGE SURVEY OF HECATE STRAIT, MAY 24-JUNE 13, 1989

by

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ABSTRACT

Antonsen, B. L., R. P. Foucher, J. Fargo, G. E. Gillespie, T. Johansson, A. V. Tyler and H. L. Waye. 1990. F/V EASTWARD HO assemblage survey of Hecate Strait, May 24-June 13, 1989. Can. Data Rep. Fish. Aquat. Sci. 783: 142 p.

During the period from May 24-June 13 1989, the F/V EASTWARD HO completed a synoptic trawl survey of groundfish species occupying the shelf area (10-129 fath; 18-236 m) of Hecate Strait. Previous surveys of this nature have been conducted in May-June 1984, Febuary 1986 and May-June 1987. The purpose of these surveys is to collect information on species assemblages in the region in the form of catch composition data. This is the first step towards development of an ecological basis for mixed species stock assessment. This report contains the results of the survey regarding weight and number for species caught and length frequencies by haul (95 usable). A summary of temperature recordings at selected depth intervals at various locations in Hecate Strait is also included.

RÉSUMÉ

Antonsen, B. L., R. P. Foucher, J. Fargo, G. E. Gillespie, T. Johansson, A. V. Tyler and H. L. Waye. 1990. F/V EASTWARD HO assemblage survey of Hecate Strait, May 24-June 13, 1989. Can. Data Rep. Fish. Aquat. Sci. 783: 142 p.

Du 24 mai au 13 juin 1989, le F/V EASTWARD HO a achevé une campagne de chalutage synoptique des espèces de poissons de fond fréquentant la plate-form (10 à 129 brasses; 18 à 236 m) du détroit d'Hécate. Des relevés de cette nature ont déjà été effectués en mai et juin 1984, en février 1986, et en mai et juin 1987. Le but de ces relevés est de recueillir des informations sur les groupes d'espèces dans la région sous forme de données sur la composition des prises. Il s'agit de la première étape de l'élaboration d'une base écologique pour l'évaluation du stock d'espèces mixtes. Le présent rapport contient les résultats du relevé concernant le poids et le nombre pour les espèces capturées et les fréquences de longueur par halage (95 utilisables). Un résumé des relevés de température effectués à des intervalles de profondeur choisis en divers endroits du détroit d'Hécate est également inclus.

INTRODUCTION

This work was carried out as part of the Pacific Biological Station's Hecate Strait Project. The purpose of the project is to develop an ecological basis for alternative, mixed-species stock assessment techniques. Species catch composition data from several synoptic surveys has been used to map on-bottom fish assemblages in Hecate Strait. Surveys conducted in different years and at different times of the year are being used to examine inter-annual and inter-seasonal variability within assemblages.

The first two surveys were conducted as joint operations with a fishing vessel and a fisheries research vessel (Fargo et al. 1984, Westrheim et al. 1984, Fargo and Davenport 1986 and Foucher et al. 1988). The third survey was conducted by a single fishing vessel in a similar manner to the survey reported here (Fargo et al. 1988).

METHODS AND MATERIALS

FISHING VESSEL

The F/V EASTWARD HO, a 32.6 m (overall length) steel stern trawler was the vessel chartered for the survey.

FISHING GEAR

The gear consisted of a Yankee 36 trawl net connected to the vessel's 2000 lb (900 kg) steel doors. For the first 90 hauls, a hard bottom, bobbin groundline was used, which consisted of seven 35.6-cm steel bobbins with 15.2-cm rubber spacers between them for the bosom section and two 35.6-cm rubber half-eggs with 15.2-cm rubber spacers for the wing sections. The headrope on this net contained 31 15.2-cm round plastic floats (Fig. 1). For the last eight hauls of the survey, a conventional soft bottom groundline consisting of 17.8-cm rubber discs was used. The headrope used with this net contained 24 15.2-cm round aluminum floats. The nets had 9.0-cm mesh in the wings and body and 2.5-cm mesh in the codend.

SURVEY DESIGN

The design for this survey followed that for the summer 1987 EASTWARD HO assemblage survey of Hecate Strait.

Stations in this survey were selected to allow proportionate sampling of all known species assemblages in Hecate Strait. Each station was tested successfully once, and four stations were replicated at the end of the survey. Haul duration was normally 20 minutes.

CATCH PROCESSING

Each trawl catch was sorted by species into plastic bins (ca. 50 kg capacity). The net weight of each bin of fish was obtained to the nearest kilogram using a platform deck balance. The total weight for each species was equal to the sum of the individual tub weights for that species.

LENGTH FREQUENCIES

Fork length was measured to the nearest centimetre for all specimens caught except spiny dogfish, skates and ratfish. Spiny dogfish were measured for total length, with the tail bent down in line with the body, skates were measured for total length and ratfish were measured to the posterior edge of the third dorsal fin. The plastic strip method (Davenport and Harling, 1965) of measuring and recording fork lengths was utilized. For dogfish, sex was also recorded based on external characteristics.

All species caught were not measured in all cases. Exceptions were A) large catches of individual species, whereupon subsampling was done using variations of the methods described by Westrheim (1967), and B) species not measured due to oversight. Usually, this involved a species constituting a very small proportion of the total haul.

TEMPERATURE DATA

During the course of this survey, an Applied Microsystems (Sidney, B.C.) STD-12 Salinity-Temperature-Depth probe was cast and retrieved following the deepest haul in each

block in a given day. Salinities and temperatures were recorded by the STD at approximately one metre depth intervals.

PACIFIC COD AGE SAMPLING

During the second half of this survey, samples of three ageing structures of Pacific cod (Gadus macrocephalus) were taken. These structures were the saggital otoliths, the left pectoral and rays 3-9 of the second dorsal fin, and a series of five scales in a vertical line from the middle of the second dorsal fin to the lateral line. In addition, the length and sex of each fish was recorded. These samples will be prepared and aged, and a comparison will be done between each method and length-frequency analysis to determine which method is most consistently accurate.

RESULTS

A total of 98 hauls were completed, of which 95 were deemed "usable" (Fig. 2). The three unusable hauls were eliminated due to snags. (Table 1).

Total fish catch from usable hauls was 44,157 kg (92,232 specimens) comprising 66 species (Table 2). Principal species by weight were arrowtooth flounder, English sole, Pacific cod, Dover sole, ratfish, rock sole, spiny dogfish, Sebastes alutus and rex sole -- 83% of the total catch. Principal species by numbers were English sole, arrowtooth flounder, rex sole, Sebastes alutus, Dover sole, rock sole, ratfish and Pacific cod -- 87% of the total catch.

Detailed records of all the trawl hauls, catch weights by species and length frequencies by species are contained in the appendix tables. An index to common and scientific names of all fish species caught is contained in Table 3.

TRAWLING SCHEME

The F/V EASTWARD HO was assigned 89 trawling stations from blocks A2 to L6 (Fig. 2, Table 4). A total of 87 stations were completed successfully, the two which were not (B201, B306)

were eliminated due to bad bottom. Three stations (B207, H405, J202) were repeated due to snags, and replicates were performed at four stations (B207, I301, I404, J504).

LENGTH FREQUENCIES

Lengths (cm) were recorded for 60,899 specimens (est. 92,232 caught). Catch subsampling occurred for one or more species in 28 hauls, and Table 5 lists estimates for the total number of fish caught in such cases. These estimates were derived using the following equation:

$n = Nw/W$, where:

n = total number of a given species caught,
N = number of a given species measured,
w = total weight of a given species caught,
and W = weight of a given species measured.

Table 2 contains an index to appendix tables containing length-frequency (or individual length) records, by haul, for each species, as well as a record of the weights (kg) and numbers of individual species caught for usable hauls on the cruise.

TEMPERATURE DATA

Temperatures as recorded by the STD probe ranged from 9.3 to 12.9°C at the surface and from 6.0 to 12.3°C on the bottom (Table 6).

PERSONNEL

R. Foucher (i/c)	Pacific Biological Station	May 24-June 13
B. Antonsen	"	May 24-June 13
G. Gillespie	"	May 24-June 3
A. Tyler	"	May 24-June 3
T. Johansson	"	June 3-June 13
H. Waye	"	June 3-June 13

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Table 1. Unusable trawls, by location and cause, of the F/V EASTWARD HO assemblage survey, May 24-June 13, 1989.

Haul no.	Block-strata	Cause
9	J202	snag
40	H405	snag, net torn
90	B207	snag, net torn

Table 2. Total weight (kg) and numbers, by species of fish specimens caught in usable hauls during F/V EASTWARD HO assemblage survey of Hecate Strait, May 24-June 13, 1989. (See appropriate appendix table number for length frequencies.)

	Weight (kg)	Numbers	Appendix table
Flatfish			
Arrowtooth flounder	12,981	16,289	33
Butter sole	422	1,194	36
Curlfin sole	26	94	74
Dover sole	3,282	6,289	38
English sole	4,752	26,407	39
Flathead sole	159	807	35
Pacific halibut	1,056	192	71
Pacific sanddab	405	2,566	31
Petrale sole	235	241	70
Rex sole	2,237	8,850	34
Rock sole	2,501	6,081	37
Sand sole	131	413	40
Speckled sanddab	1	16	32
Slender sole	38	377	72
Starry flounder	44	19	73
Sub-total	28,270	69,835	
Rockfish			
Sebastes alutus	2,264	6,607	12
Sebastes babcocki	93	55	54
Sebastes brevispinis	354	280	13
Sebastes caurinus	93	54	14
Sebastes crameri	1	1	15
Sebastes elongatus	4	11	55
Sebastes entomelas	1	1	16
Sebastes flavidus	20	78	56
Sebastes helvomaculatus	2	4	17
Sebastes maliger	149	141	57
Sebastes paucispinis	32	6	58
Sebastes pinniger	33	17	59
Sebastes proriger	10	34	60
Sebastes reedi	2	14	61
Sebastes ruberrimus	25	6	62
Sebastes zacentrus	5	20	63
Sebastolobus alascanus	38	138	18
Unknown rockfish	Tr[a]	1	11
Sub-total	3,126	7,468	

[a]Tr = trace, less than 1 kg.

Table 2 (cont'd)

	Weight (kg)	Numbers	Appendix table
Other roundfish			
Agonidae	Tr	2	28
Bigfin eelpout	Tr	15	50
Blackfin sculpin	Tr	5	23
Brown Irish lord	Tr	1	20
Cabezon	Tr	1	26
Daubed shanny	Tr	1	9
Eelpout	Tr	12	6
Eulachon	33	769	3
Great sculpin	Tr	1	24
Kelp greenling	4	20	65
Lingcod	985	279	66
Pacific cod	3,340	3,938	4
Pacific hake	2	4	48
Pacific herring	1	16	47
Pacific tomcod	3	23	49
Pacific sandlance	Tr	37	53
Red Irish lord	Tr	1	19
Roughback sculpin	Tr	18	68
Roughspine sculpin	Tr	2	27
Sculpins	Tr	2	67
Shiner perch	12	375	8
Spinycheek starsnout	Tr	1	30
Spotfin sculpin	Tr	1	22
Sturgeon poacher	5	158	69
Tadpole sculpin	Tr	1	25
Walleye pollock	477	1,037	5
Wattled eelpout	Tr	1	7
Whitebarred prickleback	Tr	2	10
Wolfeel	20	3	52
Sub-total	5,419	7,312	
Selachii			
Big skate	1,784	177	44
Black skate	63	27	46
Longnose skate	124	26	45
Ratfish	2,935	5,937	2
Spiny dogfish	2,436	1,450	41,42,43
Sub-total	7,342	7,617	
Grand totals	44,157	92,232	

Table 3. List of common and scientific names of all fish species caught during F/V EASTWARD HO assemblage survey of Hecate Strait, May 24-June 13, 1989.

Common name	Scientific name	Common name	Scientific name
Spiny dogfish	Squalus acanthias	Pacific sandlance	Ammodytes hexapterus
Big skate	Raja binoculata	Shiner perch	Cymatogaster aggregata
Black skate	Raja kincaidi	Sablefish	Anoplopoma fimbria
Longnose skate	Raja rhina	Kelp greenling	Hexagrammos decagrammus
Ratfish	Hydrolagus colliei	Lingcod	Ophiodon elongatus
Pacific herring	Clupea harengus pallasi	Roughback sculpin	Chitonotus pugetensis
Eulachon	Thaleichthys pacificus	Red Irish lord	Hemilepidotus hemilepidotus
Pacific cod	Gadus macrocephalus	Brown Irish lord	Hemilepidotus spinosus
Pacific hake	Merluccius productus	Northern sculpin	Icelinus borealis
Pacific tomcod	Microgadus proximus	Spotfin sculpin	Icelinus tenuis
Walleye pollock	Theragra chalcogramma	Blackfin sculpin	Malacocottus kincaidi
Bigfin eelpout	Aprodon cortezianus	Great sculpin	Myoxocephalus polyacanthocephalus
Wattled eelpout	Lycodes palearis	Tadpole sculpin	Psychrolutes paradoxus
Northern ronquil	Ronquilus jordani	Cabezon	Scorpaenichthys marmoratus
Daubed shanny	Lumpenus maculatus	Roughspine sculpin	Triglops macellus
Whitebarred prickleback	Poroclinus rothrocki	Northern spearnose poacher	Agonopsis vulsa
Wolfeel	Anarrhichthys ocellatus	Sturgeon poacher	Agonus acipenserinus
Pacific ocean perch	Sebastes alutus	Spinycheek starsnout	Bathyagonus infraspinata
Redbanded rockfish	Sebastes babcocki	Pacific sanddab	Citharichthys sordidus
Silvergray rockfish	Sebastes brevispinis	Speckled sanddab	Citharichthys stigmaeus
Copper rockfish	Sebastes caurinus	Arrowtooth flounder	Atheresthes stomias
Darkblotched rockfish	Sebastes crameri	Petrale sole	Eopsetta jordani
Greenstriped rockfish	Sebastes elongatus	Rex sole	Glyptocephalus zachirus
Widow rockfish	Sebastes entomelas	Flathead sole	Hippoglossoides elassodon
Yellowtail rockfish	Sebastes flavidus	Pacific halibut	Hippoglossus stenolepis
Rosethorn rockfish	Sebastes helvomaculatus	Butter sole	Isopsetta isolepis
Quillback rockfish	Sebastes maliger	Rock sole	Lepidopsetta bilineata
Bocaccio	Sebastes paucispinis	Slender sole	Lyopsetta exilis
Canary rockfish	Sebastes pinniger	Dover sole	Microstomus pacificus
Redstripe rockfish	Sebastes proriger	English sole	Parophrys vetulus
Yellowmouth rockfish	Sebastes reedi	Starry flounder	Platichthys stellatus
Yelloweye rockfish	Sebastes ruberrimus	Curlfin sole	Pleuronichthys decurrens
Sharpchin rockfish	Sebastes zacentrus	Sand sole	Psettichthys melanostictus
Shortspine thornyhead	Sebastolobus alascanus		

Table 4. Inventory of hauls, by block and depth strata, completed by the F/V EASTWARD HO, May 24–June 13, 1989.

Block-strata	Haul	Block-strata	Haul	Block-strata	Haul
A2-6	86	F2-1	48	J2-2	9[a],15
A3-3	84	F3-2	50	J2-7	10
A3-4	85	F3-3	49	J3-1	13
A3-6	83	F4-3	54	J4-1	14
		F4-4	55	J4-2	17
B1-5	80	F4-5	53	J4-4	16
B1-6	81	F4-7	56	J5-4	25,97,98
B1-7	82			J5-5	24
B2-2	87	G2-1	47	J5-6	23
B2-3	77	G3-1	46	J6-9	20
B2-5	79	G3-3	45		
B2-7	78,90[a],91,92	G3-5	44	K4-4	5
B3-1	76	G4-4	52	K4-5	6
B3-2	75	G4-5	51	K4-6	7
B3-3	74	G4-7	43	K5-6	8
B3-4	73			K6-8	18
		H2-1	35	K6-9	19
C2-1	70	H3-1	36		
C3-1	68	H3-2	37	L4-6	4
C3-2	72	H3-3	38	L4-7	3
C3-3	69	H3-4	29	L5-7	2
C3-5	71	H4-5	40[a],41	L6-10	1
		H4-6	42		
D3-1	67	H4-7	34		
D3-2	66				
D3-3	65	I2-1	11		
D3-4	64	I3-1	12,93,94		
D4-4	63	I3-3	30		
		I4-1	26		
E2-1	88	I4-2	27		
E2-2	89	I4-3	28		
E3-2	62	I4-4	29,95,96		
E3-3	61	I4-5	31		
E4-2	59	I4-7	32		
E4-5	60	I5-6	22		
E4-7	58	I5-7	33		
E5-5	57	I5-8	21		

[a] Unusable haul.

Table 5. Calculated numbers of specimens, by species, caught for hauls in which all specimens caught were not measured during F/V EASTWARD HO assemblage survey of Hecate Strait May 24-June 13, 1989.

Haul no.	Species	Weight (kg)		Numbers	
		Sample	Total	Sample	Total
10	English sole	132	411	649	2021
18	Rex sole	106	213	472	948
18	Pacific ocean perch	149	747	624	3128
18	Arrowtooth flounder	96	204	147	312
19	Pacific ocean perch	84	138	223	366
21	Pacific ocean perch	148	770	310	1613
21	Eulachon	5	22	127	559
33	Arrowtooth flounder	284	1657	372	2170
34	Rex sole	109	184	441	744
34	Dover sole	95	120	218	275
41	Pacific sanddab	36	65	208	376
55	Arrowtooth flounder	249	516	300	622
56	Dover sole	86	258	198	594
56	Arrowtooth flounder	274	421	387	595
60	English sole	74	138	277	517
60	Dover sole	80	119	258	384
60	Rex sole	75	206	446	1225
61	English sole	40	81	404	818
64	Arrowtooth flounder	153	376	274	673
65	English sole	91	314	529	1825
69	English sole	74	493	563	3751
69	Pacific cod	376	1342	511	1824
70	Butter sole	173	362	442	925
70	Rock sole	24	29	87	105
70	English sole	72	139	557	1075
71	Dover sole	115	466	415	1682
71	Rex sole	91	155	408	695
72	Pacific cod	139	486	278	972
72	English sole	61	202	689	2282
73	English sole	120	566	462	2179
73	Dover sole	59	99	252	423
74	English sole	91	435	438	2094
74	Rex sole	93	138	411	610
75	Ratfish	286	558	318	620
75	English sole	45	103	546	1250
77	Arrowtooth flounder	352	1021	227	658
79	Dover sole	277	626	218	493
79	Arrowtooth flounder	333	969	299	870
83	Ratfish	74	126	177	301
84	English sole	80	503	241	1515
85	Arrowtooth flounder	427	856	470	942
85	Ratfish	132	244	145	268
86	Arrowtooth flounder	475	1113	526	1233
89	Ratfish	151	276	234	428
91	Arrowtooth flounder	337	469	385	536

Table 6. STD temperature recordings in degrees Celsius by 10 meter depth interval taken during the F/V Eastward Ho assemblage survey of Hecate Strait, May 24 to June 13 1989.

	Haul no.																
Depth (m)	1	2	3	7	8	10	11	12	13	16	19	20	21	23	30	32	33
0	10.9	10.9	11.3	11.1	11.4	10.0	10.7	10.7	11.0	10.7	10.2	10.2	10.2	11.0	11.7	12.1	11.8
10	10.6	10.3	11.1	11.1	9.9	10.0	10.6	10.6	10.8	10.7	10.2	10.2	10.2	10.8	11.2	11.1	10.8
20	8.3	8.8	8.6	9.3	8.3	9.9	10.6	10.0	10.3	10.3	10.1	9.9	10.2	10.1	11.2	10.9	10.6
30	8.0	8.1	8.2	8.5	8.2	9.9	10.6	9.5	-	9.9	9.3	8.4	9.3	8.6	10.2	10.2	10.3
40	7.8	8.1	8.0	8.1	7.9	9.6	-	-	-	9.9	8.1	8.5	8.2	8.2	9.4	8.8	8.1
50	7.7	8.0	8.0	7.9	7.7	9.4	-	-	-	9.6	8.0	7.9	8.1	8.1	9.4	8.3	8.1
60	7.5	7.8	7.6	7.9	7.5	9.1	-	-	-	9.4	7.6	7.8	7.9	8.0	8.9	8.0	8.1
70	7.5	7.6	7.7	7.4	7.4	9.0	-	-	-	-	7.6	7.9	7.9	7.7	-	7.7	8.0
80	7.4	7.5	7.6	7.3	7.4	8.8	-	-	-	-	7.6	7.6	7.8	7.6	-	7.5	7.9
90	7.3	7.5	7.5	7.3	7.3	8.8	-	-	-	-	7.5	7.6	7.4	7.3	-	7.4	7.7
100	7.2	7.2	7.4	7.3	7.2	8.8	-	-	-	-	7.4	7.5	7.3	7.2	-	7.4	7.5
110	7.2	7.2	7.2	7.3	7.2	8.7	-	-	-	-	7.3	7.2	7.1	7.2	-	7.2	7.4
120	7.0	7.1	7.0	7.3	7.2	8.7	-	-	-	-	7.2	7.2	7.0	-	-	7.0	-
130	6.8	6.8	7.0	-	-	8.6	-	-	-	-	7.1	7.0	6.9	-	-	6.9	-
140	6.8	-	-	-	-	-	-	-	-	-	7.1	6.8	6.7	-	-	-	-
150	6.7	-	-	-	-	-	-	-	-	-	6.9	6.6	6.6	-	-	-	-
160	6.6	-	-	-	-	-	-	-	-	-	6.7	6.4	6.5	-	-	-	-
170	6.4	-	-	-	-	-	-	-	-	-	6.5	6.4	-	-	-	-	-
180	6.3	-	-	-	-	-	-	-	-	-	6.3	6.1	-	-	-	-	-
190	6.1	-	-	-	-	-	-	-	-	-	6.3	6.1	-	-	-	-	-
200	6.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
210	6.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
220	6.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bottom temp.	6.0	6.7	6.9	7.3	7.2	8.5	10.6	9.5	10.3	8.6	6.3	6.1	6.5	7.2	8.9	6.9	7.2
Bottom depth	228	134	132	123	123	134	37	31	27	67	199	190	167	111	63	137	117

	Haul no.																
Depth (m)	34	35	39	42	43	44	45	47	48	49	51	53	56	57	58	61	63
0	11.8	11.6	11.7	12.5	12.6	11.7	11.0	11.5	11.1	11.7	11.3	11.2	9.6	9.3	10.5	11.3	9.5
10	11.2	11.3	10.5	11.3	11.1	10.3	10.8	11.5	11.0	11.5	11.1	10.8	8.8	9.3	10.4	9.7	9.3
20	10.8	11.3	10.4	10.4	9.6	10.0	10.3	11.4	10.6	11.4	10.6	9.0	8.8	9.0	9.4	9.1	8.6
30	9.4	11.3	9.7	9.1	8.7	9.1	9.7	11.5	-	10.4	10.0	9.2	8.6	8.9	8.7	8.8	7.9
40	8.9	-	9.2	8.8	8.4	8.6	9.2	-	-	10.4	9.5	9.1	8.5	8.4	8.4	8.3	7.6
50	8.3	-	8.8	8.3	8.1	8.2	9.2	-	-	10.4	9.1	8.6	8.2	7.9	8.1	7.8	7.4
60	8.0	-	8.5	8.2	7.8	7.8	9.2	-	-	-	8.8	8.3	7.7	7.5	7.6	7.8	7.4
70	7.8	-	7.9	7.8	7.6	7.4	9.2	-	-	-	7.8	8.2	7.8	7.3	7.3	7.7	7.3
80	7.6	-	7.8	7.6	7.4	7.4	9.0	-	-	-	7.6	7.5	7.7	7.1	7.1	-	7.3
90	7.4	-	-	7.5	7.3	7.3	-	-	-	-	7.4	7.4	7.6	-	7.1	-	-
100	7.3	-	-	7.3	7.2	-	-	-	-	-	-	-	7.3	-	7.1	-	-
110	7.2	-	-	7.2	7.0	-	-	-	-	-	-	-	7.2	-	7.1	-	-
120	7.0	-	-	7.1	7.0	-	-	-	-	-	-	-	7.1	-	7.1	-	-
130	6.8	-	-	-	7.0	-	-	-	-	-	-	-	7.1	-	-	-	-
Bottom temp.	6.8	11.3	7.8	7.1	7.0	7.3	9.1	11.4	10.5	10.4	7.4	7.2	7.0	7.1	7.1	7.7	7.3
Bottom depth	135	30	81	121	130	91	80	35	29	51	94	99	139	88	129	75	80

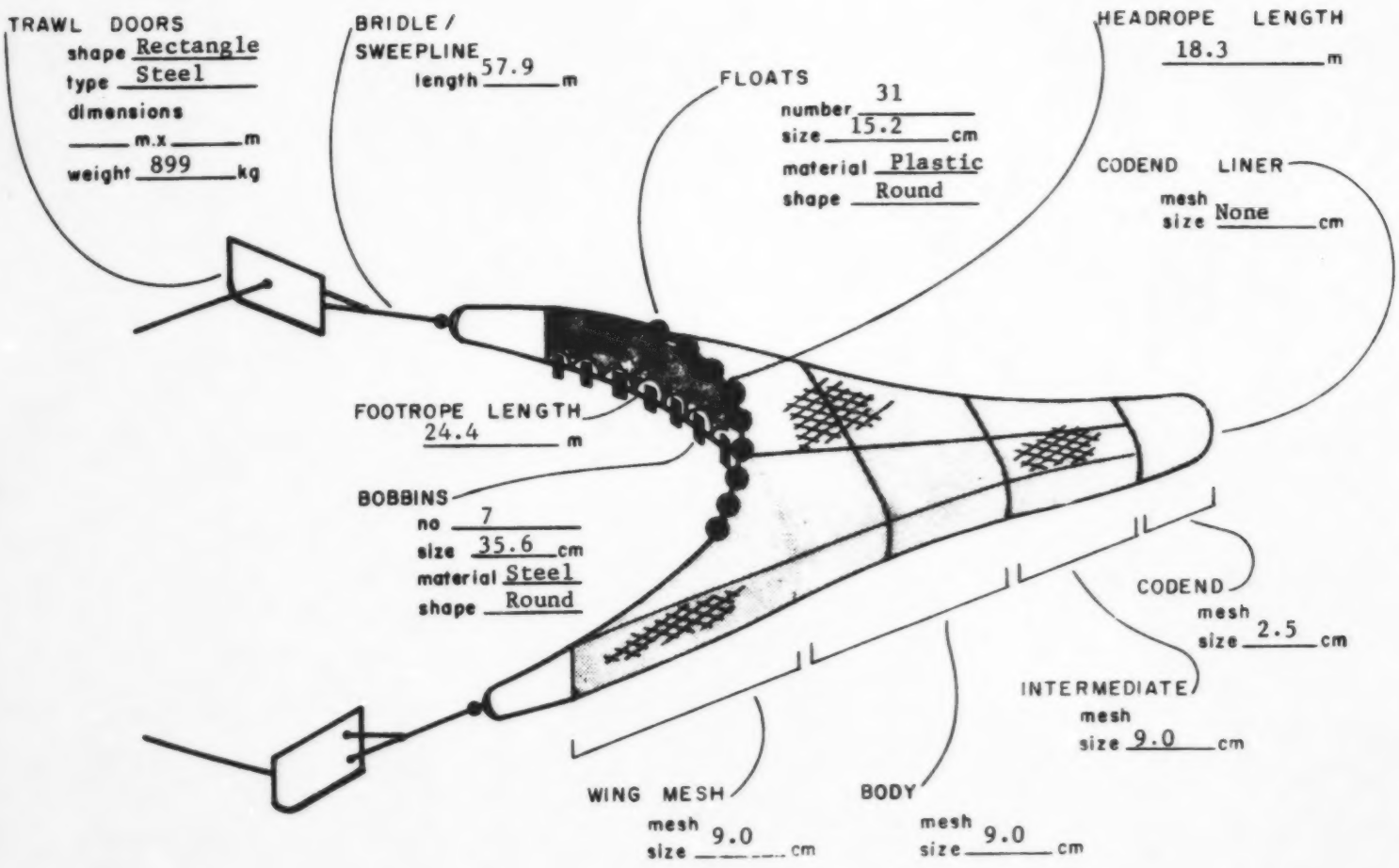
Table 6 (cont.)

Depth (m)	Haul no. 64	69	70	71	73	76	78	82	83	86	87	89	92	94	96	98
0	9.8	10.1	10.3	9.6	10.5	10.6	10.7	10.4	10.7	10.5	10.6	10.7	11.7	12.9	11.8	11.3
10	9.6	10.0	10.3	9.8	9.9	10.4	10.5	10.3	9.6	10.4	9.6	10.7	10.4	12.5	11.5	10.1
20	8.4	9.8	10.3	9.7	9.7	9.9	10.2	9.1	7.8	10.1	7.7	10.7	10.0	12.4	11.0	9.9
30	8.1	9.3	10.3	9.6	9.5	9.5	10.0	7.9	7.4	8.4	7.3	10.8	8.7	12.3	10.6	9.7
40	8.0	8.9	-	9.6	8.3	-	9.8	7.7	7.2	7.4	6.9	10.8	7.9	-	11.4	9.3
50	7.4	8.4	-	8.6	7.3	-	8.5	7.3	7.1	6.9	6.9	-	7.1	-	9.8	9.0
60	7.0	8.4	-	7.9	7.1	-	7.5	6.7	6.9	6.7	-	-	6.8	-	9.2	8.3
70	6.9	7.9	-	7.3	6.9	-	7.1	6.7	6.9	6.7	-	-	6.6	-	8.2	7.9
80	-	7.0	-	7.0	-	-	6.8	6.6	6.8	6.7	-	-	6.6	-	7.4	7.8
90	-	-	-	6.9	-	-	6.7	-	6.7	6.6	-	-	6.6	-	7.0	7.8
100	-	-	-	6.8	-	-	6.7	-	6.6	6.5	-	-	6.6	-	-	7.3
110	-	-	-	-	-	-	6.5	-	6.6	-	-	-	6.5	-	-	-
120	-	-	-	-	-	-	-	-	6.5	-	-	-	6.5	-	-	-
130	-	-	-	-	-	-	-	-	-	-	-	-	6.5	-	-	-
Bottom temp.	6.9	7.0	10.3	6.8	6.9	9.5	6.5	6.6	6.5	6.5	6.9	10.8	6.5	12.3	7.0	7.2
Bottom depth	79	83	31	103	70	31	128	83	126	104	53	46	137	34	92	103

Fig. 1. NET DIMENSIONS AND CHARACTERISTICS FOR BOTTOM TRAWL

VESSEL EASTWARD HO NET Yankee 36

OBSERVATION PERIOD May 24-June 13, 1989



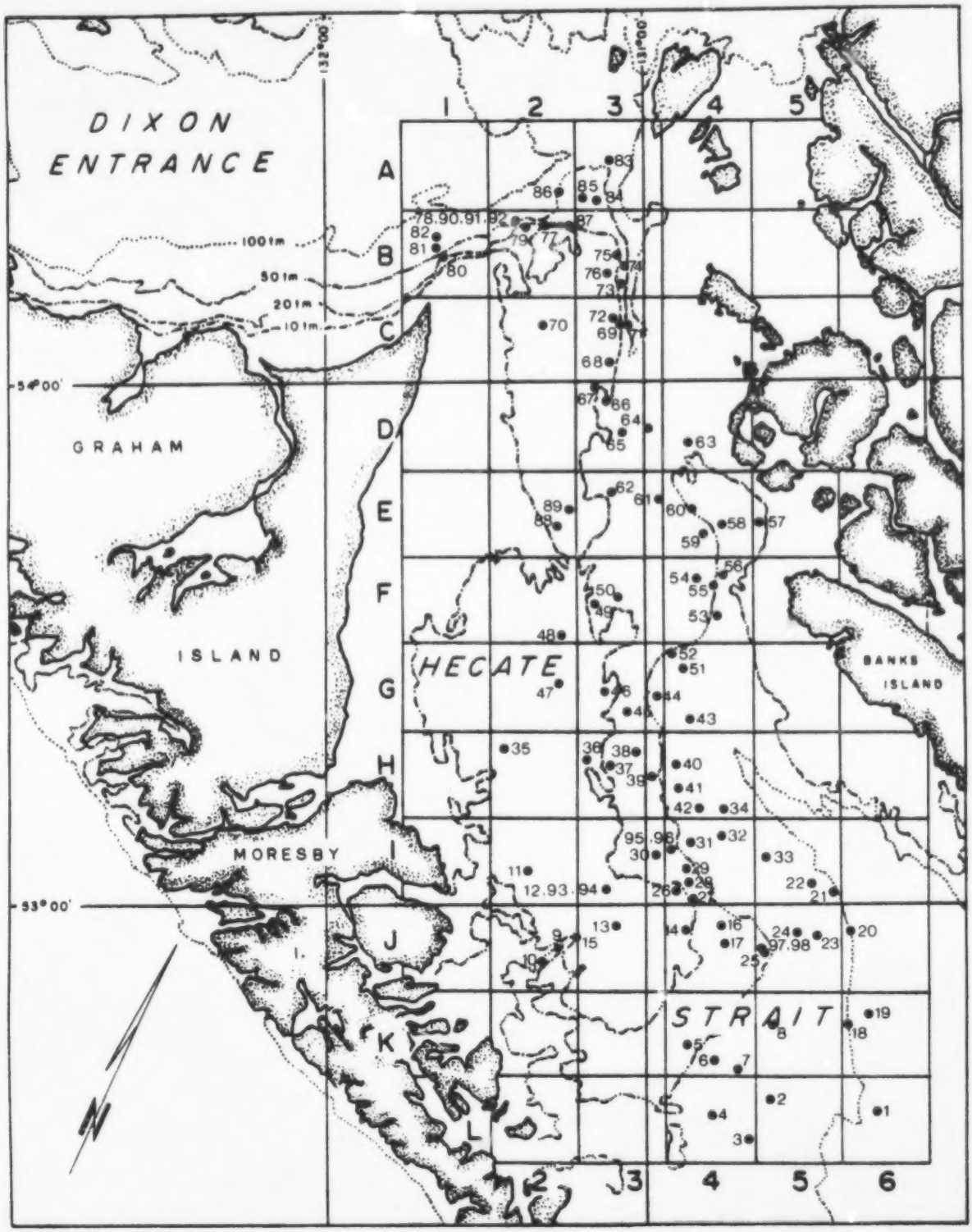


Fig. 2. Haul locations for F/V Eastward Ho species assemblage survey of Hecate Strait, May 24 - June 13, 1989.